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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/236,350	01/25/1999	ISAMU UENO	35.C13282	1615

5514 7590 10/04/2005

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EXAMINER

MISLEH, JUSTIN P

ART UNIT PAPER NUMBER

2612

DATE MAILED: 10/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/236,350

Applicant(s)

UENO ET AL.

Examiner

Justin P. Misleh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed July 11, 2005 have been fully considered but they are not persuasive.
2. Applicant argues that four pixels of two rows x two columns (four pixels D in Fig. 3) are not those of a color periodicity unit of the color filter array, since in other figures in Ukita (Figs. 2, 10 – 13, 18, and 22) the color filter array has color periodicity unit of four rows x two columns.
3. Applicant characterization of Ukita's figure 3 wherein the pixels of two rows x two columns (four pixels D in fig. 3) to operate the signals is correct; however, Applicant's arguments regarding the color periodicity unit are misplaced.
4. In the Non-Final Office Action (mailed April 7, 2005), the Examiner relied upon Takizawa to disclose the claim limitation "wherein said color filter array has a color periodicity unit of two rows x two columns." In support thereof, the Examiner pointed out that Takizawa specifically states, "Figures 4 to 6 each illustrate a basic structure of combination of each color filter and according to the number of pixels of the CCD, the filter structure having the same pattern is repeatedly employed." Figures 4 to 6 clearly shows a "color periodicity unit of two rows x two columns" wherein the colors "are all different from each other and have fixed positions," as presently claimed. Furthermore, as admitted by Applicant, Ukita teaches to operate the color difference signals using pixels of two rows x two columns. Therefore, the

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combination at least provides a two rows x two columns color periodicity unit and an operation circuit for operating color difference signals thereupon.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1 – 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa et al. in view of Ukita.

7. For **Claim 1**, Takizawa et al. disclose, as shown in figure 4 and 5 and as stated in column 8 (lines 44 – 54), an image pickup apparatus (see figure 1) comprising:

a plurality of pixels (There is a one-to-one correspondence of each filter color to a single pixel; see column 6, lines 34 – 40.);

a color filter array (Any one of the respective filter of figures 4 and 5.) of four colors (combination complimentary colors) disposed on said plurality of pixels (see column 8, lines 44 – 54);

wherein said color filter array (see figures 4 and 5) has a color periodicity unit of two rows x two columns (Takizawa et al. specifically states, “Figures 4 to 6 each illustrate a basic structure of combination of each color filter and according to the number of pixels of the CCD, the filter structure having the same pattern is repeatedly employed.”); and

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wherein colors of the color filters in the color periodicity unit of two rows x two columns are all different from each other and have fixed positions (In figure 4, the four colors are: Magenta, Green, Cyan, and Yellow. In figure 5, the four colors are: White, Green, Cyan, and Yellow.).

While Takizawa et al. disclose wherein the color filter array has a color periodicity unit of two rows x two columns and an operation circuit for performing interpolation on the basis of the color periodicity unit; Takizawa et al. do not disclose an operation circuit that provides at least two different color difference signals on the basis of a two rows x two columns arrangement.

On the other hand, Ukita also provides an image pickup apparatus with a color filter array of four filters disposed in two rows x two columns arrangement and an operation circuit. More specifically, Ukita teaches, as shown in figure 3 and as stated in columns 9 (lines 38 – 58), 10 (lines 48 – 67), and 11 (lines 1 – 33), an operation circuit (CLCRCB generation circuit 104) that provides two different color difference signals (CR corresponding to equations 18 – 20 and CB corresponding to equations 21 – 23) on the basis of four color pixels. Ukita states, “the data of signals $D(x, y)$, $D(x+1, y)$, $D(x, y+1)$, and $D(x+1, y+1)$ read out from CCD 10 stored in RAM 106 corresponding to pixels (x, y) is read out by CLCRCB generation circuit 104, which multiplies these signals by factors $Kc(x, y)$, $Kc(x+1, y)$, $Kc(x, y+1)$, and $Kc(x+1, y+1)$ depending on the color of a filter corresponding to each read out data, then adds up the results to generate a signal $Cc(x, y)$ corresponding to the central position of these four pixels (x, y) , $(x+1, y)$, $(x, y+1)$, and $(x+1, y+1)$ ” disposed in a two rows x two columns arrangement. Therefore, Ukita discloses

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an operation providing two color difference signals using all the pixels included in the color periodicity unit of the color filter array.

As stated in Ukita at column 7 (lines 23 – 33), at the time the invention was made, one with ordinary skill in the art would have been motivated to include an operation circuit that provides at least two different color difference signals using all the pixels included in the color periodicity unit, as taught by Ukita, in the image pickup apparatus, of Takizawa et al., as a means for increasing the number of effective pixels of the image pickup apparatus and restricting the generation of ghost color signals. Therefore, at the time the invention was made, it would have been obvious to one with ordinary skill in the art to include an operation circuit that provides at least two different color difference signals using all the pixels included in the color periodicity unit, as taught by Ukita, in the image pickup apparatus, of Takizawa et al.

8. As for **Claim 2**, Takizawa et al. disclose, as shown in figure 4, an image pickup apparatus according to Claim 1, wherein the color filters in the color periodicity unit include a filter for transmitting only green light (G of figure 4) in a visible light range, a filter for intercepting only blue (Ye of figure 4) color in the visible light range, a filter for intercepting only green light (Mg of figure 4) in the visible light range, and a filter for intercepting only red light (Cy of figure 4) in the visible light range.

9. As for **Claim 3**, as shown in Claim 1, Ukita also disclose, as shown in figure 8, an image pickup apparatus comprised of a plurality of pixels and a color filter array of four colors (Mg, G, ye, and Cy) disposed on said plurality of pixels wherein colors of color filters within a unit of two rows by two columns are all different (clearly shown in figure 8). In addition, Ukita disclose, as shown as stated in columns 15 (lines 33 – 64), 16, and 17 (lines 1 – 59), the image

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pickup apparatus further comprising a first operation unit which performs an operation of $A + B - C - D$ (see column 15, lines 44 – 54), where A, B, C, and D represent signals picked up from an area of two rows by two columns. As stated in columns 16 (7 – 12), at the time the invention was made one with ordinary skill in the art would have been motivated to include the first operation performing the operation $A + B - C - D$ as taught by Ukita in the image pickup apparatus of Takizawa et al. as a means to provide a luminance and a color difference signal for each pixel thereby yielding a high resolution color separation. Therefore, at the time the invention was made, it would have been obvious for one with ordinary skill in the art to include the first operation performing the operation $A + B - C - D$ as taught by Ukita in the image pickup apparatus of Takizawa et al.

10. As for **Claim 5**, as shown in Claim 3, Ukita also disclose, as shown in figure 8, an image pickup apparatus comprised of a plurality of pixels and a color filter array of four colors (Mg, G, ye, and Cy) disposed on said plurality of pixels wherein colors of color filters within a unit of two rows by two columns are all different (clearly shown in figure 8). In addition, Ukita disclose, as shown as stated in column 15 (lines 33 – 64), 16, and 17 (lines 1 – 59), the image pickup apparatus further comprising a first operation unit which performs an operation of $A + C - B - D$ (see column 16, lines 39 – 46), where A, B, C, and D represent signals picked up from an area of two rows by two columns. As stated in columns 16 (7 – 12), at the time the invention was made one with ordinary skill in the art would have been motivated to include the first operation performing the operation $A + C - B - D$ as taught by Ukita in the image pickup apparatus of Takizawa et al. as a means to provide a luminance and a color difference signal for each pixel thereby yielding a high resolution color separation. Therefore, at the time the

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invention was made, it would have been obvious for one with ordinary skill in the art to include the first operation performing the operation $A + C - B - D$ as taught by Ukita in the image pickup apparatus of Takizawa et al.

11. As for **Claims 4 and 6**, Ukita disclose, as shown in column 15 (lines 44 – 54), the image pickup apparatus wherein the signals A and B ($D_{0,0}$; $D_{0,1}$, respectively) are disposed on a same line or on a same column, and the signals C and D ($D_{1,0}$; $D_{1,1}$, respectively) are disposed on a same line or column.

12. As for **Claim 7**, Takizawa et al. disclose, an image pickup apparatus comprising: a plurality of pixels; and a color filter array of four colors disposed on said plurality of pixels, wherein said color filter array has a periodicity of two rows by two columns, and wherein colors of color filters in a periodical unit of two rows by two columns are all different from each other and have fixed positions. Takizawa et al. do not disclose, the image pickup apparatus further comprising a first read-out unit which reads out a difference between: (a) an addition signal of a first row, first column signal and a first row, second column signal, and (b) an addition signal of a second row, first column signal and a second row, second column signal, in an area of two rows by two columns, and a second readout unit which reads out a difference between: (a) an addition signal of a first row, first column signal and a second row, first column signal, and (b) an addition signal of a first row, second column signal and a second row, second column signal, in the area of two rows by two columns.

However, Ukita also disclose, as shown in figure 8, an image pickup apparatus comprised of a plurality of pixels and a color filter array of four colors (Mg, G, ye, and Cy) disposed on said plurality of pixels wherein colors of color filters within a unit of two rows by two columns are all

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different (clearly shown in figure 8). In addition, Ukita disclose, as shown as stated in columns 15 (lines 33 – 64), 16, and 17 (lines 1 – 59), the image pickup apparatus further comprising a first read-out unit (see column 15, lines 44 – 54) which reads out a difference between: (a) an addition signal of a first row, first column signal and a first row, second column signal, and (b) an addition signal of a second row, first column signal and a second row, second column signal, in an area of two rows by two columns, and a second readout unit (see column 16, lines 39 – 46) which reads out a difference between: (a) an addition signal of a first row, first column signal and a second row, first column signal, and (b) an addition signal of a first row, second column signal and a second row, second column signal, in the area of two rows by two columns. As stated in columns 16 (7 – 12), at the time the invention was made one with ordinary skill in the art would have been motivated to include a first and second readout unit performing the operations as taught by Ukita in the image pickup apparatus of Takizawa et al. as a means to provide a luminance and a color difference signal for each pixel thereby yielding a high resolution color separation. Therefore, at the time the invention was made, it would have been obvious for one with ordinary skill in the art to include the first and second readout units performing the operations as taught by Ukita in the image pickup apparatus of Takizawa et al.

13. As for **Claim 8**, Takizawa et al. disclose, as shown figures 4 – 6, the image pickup apparatus wherein areas of two rows by two columns are disposed without any space there between.

14. **Claims 9 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa et al. in view of Ukita in further view of Sugiki.

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15. As for **Claims 9 and 10**, Takizawa et al. in view of Ukita et al. show that it is obvious to provide an image pickup apparatus comprising a plurality of pixels; and a color filter array of four colors disposed on said plurality of pixels, wherein said color filter array has a periodicity of two rows by two columns, wherein colors of color filters in a periodical unit of two rows by two columns are all different from each other and have fixed positions and an operation circuit that provides at least two different color difference signals on the two rows x two columns basis. However, Takizawa et al. in view of Ukita do not disclose an image pickup apparatus further comprising a read-out unit that reads out an addition signal of all signals in an area of four rows x one column.

However, Sugiki also disclose an image pickup apparatus comprising a plurality of pixels and a color filter array of four colors disposed on said plurality of pixels. More specifically, as shown in figure 1, the four colors disposed on the plurality of pixels are Green, Cyan, Blue, and Magenta. As stated in column 1 (lines 54 – 59), to obtain one color signal, four signals representing four adjacent pixels of the same column must be processed. Thus, Sugiki teach the read-out unit that reads out an addition signal of all signals in an area of four rows x one column. As stated in column 1 (lines 43 – 46), at the time the invention was made, one with ordinary skill in the art would have been motivated to include a read-out unit that reads out an addition signal of all signals in an area of four rows x one column, as taught by Sugiki, in the image pickup apparatus of Takizawa et al. in view of Ukita, as for reading data of all the pixels within one field-period thereby enhancing the time-domain resolution without reducing sensitivity of the imaging device. Therefore, at the time invention was made, it would have been obvious to one with ordinary skill in the art to have include a read-out unit that reads out an addition signal of all

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signals in an area of four rows x one column, as taught by Sugiki, in the image pickup apparatus of Takizawa et al. in view of Ukita.

Furthermore, Sugiki does not disclose a read-out unit that reads out an addition signal of all signals in an area of four columns x one row. However, for the same motivation that it would have been obvious to include a read-out unit that reads out an addition signal of all signals in an area of four rows x one column, it also would have been obvious to include a unit that reads out an addition signal of all signals in an area of four columns x one row.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Justin P Misleh whose telephone number is 571.272.7313. The Examiner can normally be reached on Monday through Friday from 8:00 AM to 5:00 PM.

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If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Ngoc Yen Vu can be reached on 571.272.7320. The fax phone number for the organization where this application or proceeding is assigned is 571.273.3000.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM

September 27, 2005



NGOC-YEN VU
PRIMARY EXAMINER